Froedtert & College of Wisconsin

Community Physicians

Origination N/A

Last Approved N/A

Effective Upon Approval

Last Revised N/A

Next Review 2 years after

approval

Owner Carolyn Webb:

Heme Technical

Specialist

Area Hematology

Applicability Community

Physician

CP Pathologist Smear Review Effective 3/19/25

SCOPE

Froedtert Community Physicians Labs Effective 3/19/25

- CP Moorland Reserve
- CP Town Hall
- CP West Bend
- CP Tosa
- · CP North Hills
- CP Mequon
- · CP Drexel Labs

PURPOSE

This procedure provides criteria and instructions for submitting abnormal hematology smears, urine sediment, and results to pathologist for review.

The procedure also includes educational information about various types of leukemias.

Definitions:

CLL/SLL - Chronic lymphocytic leukemia/Small lymphocytic lymphoma: The typical CLL/SLL lymphocyte is mature-appearing with high nuclear to cytoplasmic ratios, scant agranular cytoplasm, and irregularly condensed chromatin without nucleoli. Chromatin pattern has a typical "soccer ball" pattern. Numerous smudge cells may be present. CLL primarily affects the blood, with clonal cells \geq 5,000/mm³ whereas SLL primarily affects the lymph nodes.

CMML - Chronic Myelomonocytic Leukemia: CMML has a persistent increased monocyte count, at ≥1,000/

mm³. There are two stages for CMML: CMML-1 has less than 5% blasts in blood, and CMML-2 has between 5-20% blasts in blood.

APL - Acute Promyelocytic Leukemia: APL can lead to disseminated intravascular coagulation (DIC) and requires early treatment with drugs different that those for other acute leukemias. For this reason, pathology smear review is performed stat when APL is suspected. The typical acute promyelocytic leukemia promyelocyte has a folded, bilobed, kidney-shaped, sliding plate/butterfly, or dumb-bell shaped nuclei with a high nuclear-cytoplasmic ratio, fine chromatin, and prominent nucleoli. Single to multiple Auer rods may be present, but are not required. Many azurophilic cytoplasmic granules may also be present, but are absent in the hypogranular variant of APL. As such, the nuclear morphology is key in suspecting a diagnosis of APL.

MDS - Myelodysplastic Syndrome: MDS is characterized by cytopenia(s) and dysplasia in at least one of the marrow lineages (myeloid, erythroid, and/or megakaryocytic), ineffective hematopoiesis, oftentimes recurrent cytogenetic abnormalities, and an increased risk of progression to acute myeloid leukemia (AML). MDS is further sub-classified depending on the number of cytopenias, dysplasia, presence of ring sideroblasts, and associated cytogenetic and/or molecular abnormalities.

AML - Acute Myeloid Leukemia: Acute myeloid leukemia (AML) has many other names, including acute myelocytic leukemia, acute myelogenous leukemia, acute granulocytic leukemia, and acute non-lymphocytic leukemia. The World Health Organization has many subclasses for Acute Myeloid Leukemia based on cell appearance, genetic changes, and other criteria. Classifications for cases of AML without recurrent cytogenetic or molecular abnormalities (AML, not otherwise specified) include:

- AML with minimal differentiation (FAB M0)
- AML without maturation (FAB M1)
- AML with maturation (FAB M2)
- Acute myelomonocytic leukemia (FAB M4)
- Acute monoblastic/monocytic leukemia (FAB M5)
- Pure erythroid leukemia (FAB M6)
- Acute megakaryoblastic leukemia (FAB M7)
- · Acute basophilic leukemia
- · Acute panmyelosis with fibrosis

FWBH - Froedtert West Bend Hospital (formerly known as St. Joseph Hospital)

WDL - Wisconsin Diagnostic Laboratory

Criteria For Slide Review: GENERAL GUIDELINES

- A. The need for a pathology smear review is determined by multiple methods.
 - 1. Caresphere middleware is designed to flag for path review criteria generated by analyzer counts. Caresphere rule will add the pathology smear review test if criteria is met.
 - 2. Path Review criteria from smear reviews must be identified by tech and path review

ordered by tech in Caresphere.

- a. Examples of pathology review criteria for which the tech will add path review: RBC morph (scistos/spheros/marked abnormalities), parasites, WBC Crystals, WBC inclusions, hypersegs, reactive lymphs, giant plts, plasma cells, micromegakaryocytes.
- 3. If upon further investigation the tech determines that a Path Review that was ordered is not needed, the tech may remove the path review in Caresphere before results are validated in Caresphere.
- B. Any slide showing unusual or unexplained numerical and/or morphologic abnormalities of white blood cells, red blood cells or platelets should be reviewed by a pathologist unless the smear was previously sent for a pathologist's review within the indicated time frame.
- C. New patients with indicated abnormal finding and any drastic changes in a patient's blood picture should be brought to a pathologist's attention. A finding on established patients is considered "new" if it has not been reviewed in the past 12 months.
- D. Pathology smear review is required only once during a 12 month period for the same review criteria. EXCEPTIONS:
 - 1. Blast cases are reviewed every 90 days
 - 2. Additional reviews should occur within the stated time frame if:
 - a. specifically requested by the attending physician
 - b. patient results have significantly changed
 - c. a different abnormality has triggered a review by the pathologist.
- E. Path reviews are only done on CBC, CBCD, and WBCD orders.
 - If CBC was ordered without differential and a pathology review is needed, rerun blood in default mode and include automated differential results in the peripheral blood pathology review request.
- F. Include the original stained blood smear and an unstained properly labeled blood smear for pathology review.
 - If unclassified cells are present, circle the area of the smear where representative cell is located. If Cellavision was used for differential, include in reason for review the Cellavision class and cell number of the cell in question.
 - 2. Keep an additional unstained blood smear in the lab in case something happens to the smear in-transit.

For the purpose of the criteria below:

- A. Initial = every 12 months with the path review being completed at Froedtert (Thedacare path reviews are not acceptable.)
- B. If Stat is not marked it is to be sent routine.
- C. If initial is not marked, review should be sent with every occurrence or at interval specified in "Details" column.

Red Blood Cells

Initial	Parameter	STAT	Exceptions	Details
X	MCV <70fL and HGB <8 g/ dL		 Known Myelodysplastic Syndrome (MDS) Known Myeloma Documented low Ferritin result in the last 7 days 	
X	MCV >110 fL, HGB <10 g/ dL, and RDW >20.0		 Known MDS Known Myeloma Current chemotherapy (within 3 weeks) Previously documented path review and/or documented for macrocytic anemia 	
	Spherocytosis (≥3/HPF) and HGB <8 g/dL	X	• If HGB is >8 send path review routine	 After initial review send routine every 7 days
	Schistocytes (≥3/HPF) and platelet count <165	X	 If the platelet count is >165 send path review routine 	 After initial review send routine every 7 days
	Marked morphological abnormalities (Ovalocytes, Elliptocytes, RBC Agglutination, Bite Cells)			
	Organisms			If bacteria is suspected, send an

Initial	Parameter	STAT	Exceptions	Details
				additional unstained smear with the Heme slide.
				 If parasites are suspected, send EDTA aliquot labeled with Path Review label along with the Heme slide.
				 If path review is needed- send STAT
	Cryoglobulins			

White Blood Cells (not including unclassified cells/blasts)

Initial	Parameter	STAT	Exceptions	Details
X	WBC Count <2.0 k/uL		Cancer Center Patient	
X	WBC Count >50 k/uL		 Growth factor administration-Neupogen, Neulasta, Filgrastim (within 3 weeks) Known CLL/SLL (documented in a path review from Froedtert) Known CMML (documented in a path review from Froedtert) Newborns in reference range 	
	WBC Crystals			
	WBC inclusions of bacteria or anaplasma Refer to images in attachment	X		 If bacteria is suspected, send an additional unstained smear with the Heme slide. If parasites are suspected, send EDTA

Initial	Parameter	STAT	Exceptions		Details
					aliquot labeled with Path Review label along with the Heme slide. If path review is needed- send STAT
X	>5 hyposegmented PMNs (including Pelger- Huet anomaly)		 Current chemotherapy (within 3 weeks) Patients diagnosed with acute leukemia or myelodysplastic syndrome Solid organ transplant patients 		
X	Absolute lymphocyte count of >5.0 k/uL in adults >40 years of age		 Known leukemia/ lymphomas Previous path review suggesting flow cytometry 		Manually check MDIF absolute counts to determine if path review is needed.
X	CLL smears with atypical morphology Refer to images in attachment				
	>10% reactive lymphocytes per 100 cells in anyone >10 years of age		Positive monospot		
	Smears containing sezary cells, hairy cells, or lymphoma cells			•	After initial review send every 90 days
Х	>5% Plasma cells				
X	Absolute monocyte # of >1.5 k/uL with Mono% >20% in adults >40 years of age		 Known CMML (documented in a path review from Froedtert) Long Term Care 	•	Manually check MDIF absolute counts to determine if path review is needed.

Initial	Parameter	STAT	Exceptions	Details
			(LTC) patients	
			 Solid malignant tumor patients 	
			 Growth factor administration- Neupogen, Neulasta, Filgrastim (within 3 weeks) 	

Blasts/Unclassifed Cells/Blast Equivalents

- A. The following cell types are considered blast equivalents
 - 1. Promonocytes should be counted as blasts/unclassified
 - 2. Promyelocytes in a patient with APL should be counted as blasts/unclassifed
 - 3. Prolymphocytes should be counted as lymphs
 - a. Note: Prolymphs are considered blast equivalents, but they are to be classified as lymphocytes and not blasts because they are part of the lymphocyte lineage and need to be monitored with the absolute lymphocyte count for patients that have certain types of cancers. It is crucial to their treatment plan. Blasts are not included in absolute count calculations.

Initial	Parameter	STAT	Exceptions	Details
	1-2% Blasts/Unclassifed		 Send STAT if APL morphology or Auer Rods present Blasts in presence of neutrophilia (>7 k/uL) and toxic change Growth factor administration -Neupogen, Neulasta, Filgrastim (within 3 weeks) Recent bone marrow transplant (within 10 days) 	 If initial path review is still pending, continue to classify the cells under 'unclassified cells' but it is not necessary to send for a path review a second time Blasts can be called when confirmed by the hematopathologist in a previous path review, bone marrow report, or peripheral blood flow report (Only use the flow report when blasts are called in the morphology section) After initial review send every 90 days

Initial	Parameter	STAT	Exceptions	Details
	>2% Blasts/Unclassified >5% Blasts/Unclassifed after growth factor administration (within 3 weeks)	X	Blasts in presence of neutrophilia (>7 k/uL) and toxic change Growth factor administration -Neupogen, Neulasta, Filgrastim (within 3 weeks) Recent bone marrow transplant (within 10 days)	 If initial path review is still pending, continue to classify the cells under 'unclassified cells' but it is not necessary to send for a path review a second time Blasts can be called when confirmed by the hematopathologist in a previous path review, bone marrow report, or peripheral blood flow report (Only use the flow report when blasts are called in the morphology section) After initial review send every 90 days If initial path review is still pending, continue to classify the cells under 'unclassified cells' but it is not necessary to send for a path review a second time Blasts can be called when confirmed by the hematopathologist in a previous path review, bone marrow report, or peripheral blood flow report (Only use the flow report when blasts are called in the morphology section) After initial review send every 90 days
	Progranulocytes typical of APL (Auer rods, bi-lobed/ sliding plate nuclear morphology)	X		 If initial path review is still pending, continue to classify the cells under 'unclassified

Initial	Parameter	STAT	Exceptions	Details
				cells' but it is not necessary to send for a path review a second time
				 Blasts can be called when confirmed by the hematopathologist in a previous path review, bone marrow report, or peripheral blood flow report (Only use the flow report when blasts are called in the morphology section) After initial review send every 90 days

Platelets

Initial	Parameter	STAT	Exceptions	Details
Χ	Platelet count of ≥1000 k/uL			
X	>5 giant platelets per 100 cell differential			
	Presence of micromegakayocytes		Known MDSKnown myeloproliferative neoplasmKnown AML	

Urines

Initial	Parameter	STAT	Exceptions	Details
	Malignant Cells			 Send urine specimen labeled with pathology smear review label for cytospin stained slide
X	Pathologic Crystals (leucine/tyrosine/ cystine)			 Send urine specimen labeled with pathology smear review.

Path Reviews are not Needed in the Following Cases:

A. Sickle Cell Patients

- B. Chemotherapy patients with leukopenia or thrombocytopenia
- C. Cytopenias in patients with liver disease (if documented in previous path review)

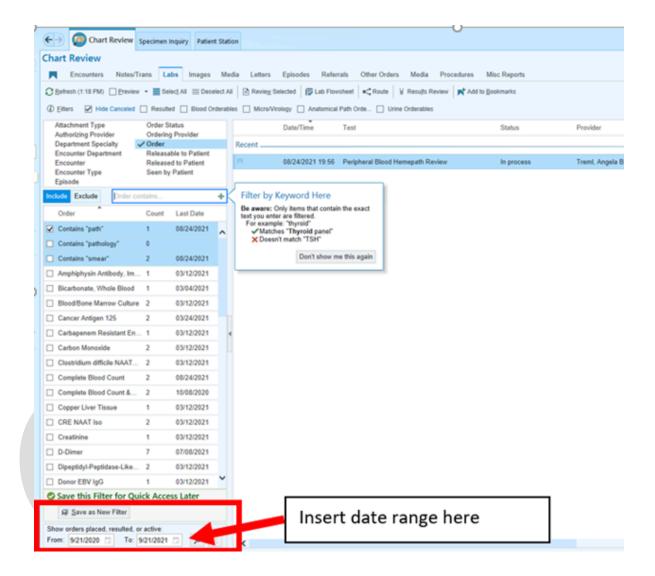
PROCEDURE

Path Review Orders in Caresphere

- A. Complete manual differential, morphology, and Path Review results in Carepshere.
 - 1. Result Path Review as "Slide Sent" in Caresphere. Ensure all tests are resulted before selecting "Validate All" in Caresphere.
 - 2. If manual differential is not required by criteria, pathology smear review may be sent using automated differential results.
 - 3. For CBC orders, add Auto Diff results to Reason for Review in Beaker Path Review order using .MDIFF.
- B. If Path Review is needed but was not added by Caresphere, add the test before validating the CBC, CBCD or WBCD result.
 - 1. Use Action>Add Test>PATH Pathology Review to add the path review test.
- C. If Path Review was found to be necessary after the initial order was final verified, use Specimen Update in Beaker to add the Pathology Smear Review.
 - Specimen Update>Add-Ons>New Orders>Order Search for "path review" and select LAB2011 Peripheral Blood Hemepath Review LAB ONLY test>Accept>Accept
- D. To remove a pathology smear review request in Caresphere that is not needed, check the box for Path Review in the Manual column>go to Details at lower left of screen> choose Remove Test. Do NOT choose Cancel as this will cancel the entire original order.

Look for Previous Pathology Review

- A. To determine if patient has already been reviewed by pathologist you may check patient history in Epic.
- B. Go to Patient Station and search for patient's medical record number or name. Select matching patient record.
- C. Click on Chart Review tab, then choose Labs.
- D. Narrow down the orders seen by choosing "Resulted" and "Blood Orderables". Filter can be applied for test Order contains "path". A time frame can be set at the bottom of the Filters screen (From: "Y-1" for a year ago; To: "T" for today). Results meeting criteria will appear in larger pane to the right of filters window. Click on order to see results.

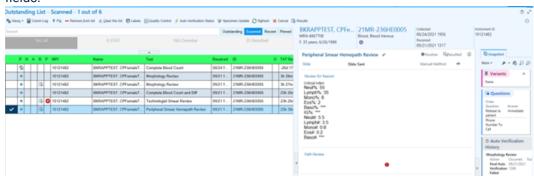


Completing Peripheral Blood Pathology Review Request in Beaker

- A. Results validated in Caresphere that need additional follow up will appear on the on the Beaker Outstanding List. Select the specimen.
- B. Beaker will automatically jump to the Scanned tab of the Hematology Outstanding list.
- C. Click on the pencil icon next to Peripheral Smear Hemepath Review.
 - 1. "Slide Sent" will be filled in from Caresphere
 - 2. Type in your reason for review. Dot phrases matching path review criteria are available see attachment.
 - a. If path review is initially added for CBC results and then has manual diff criteria also, go back into the reason for review and add the additional criteria.
 - b. Provide description of unclassified cells. If Cellavision was used for differential, include the Cellavision class and cell number of the cell in question.
 - c. If unclassified cells are present, circle the area of the smear where representative cell is located. Circling the smear location of unclassified cells

is required regardless of whether the smear was reviewed at the microscope or via Cellavison.

3. If Path Review is needed on CBC order, use SmartPhrase ".mdf" in Reason for Review field and type the autodiff results into the SmartPhrase using F2 to move between *** fields.



D. Click the **save** icon next to "Peripheral Smear Hemepath Review".

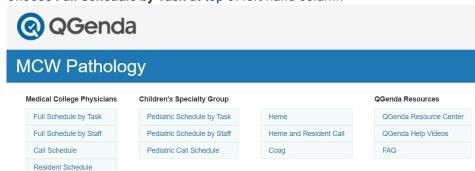
Peripheral Smear Hemepath Review

- E. Specimen label will print for the path review. Label the slide container with this label.
- F. Make an extra slide (regular and albumin if appropriate) to keep at originating lab.

Sending Path Review Specimens

- A. Package for transport using STAT specimen bag
- B. Send smears in slide carrier: send 1 stained slide and 1 unstained slide. If an albumin smear was made, send that as well.
- C. CBC, CBCD and any associated differential/morphology results are automatically linked to the path review order. There is no paperwork associated with the Beaker path review process
- D. Put on Ambient packing list, Ready, Pickup, and Send to performing location. If STAT review is needed, send by most expeditious method whether it is with routine courier pickup or calling for a STAT courier.
 - a. All routine path reviews are sent to WDL, except that West Bend Health Center sends all path reviews to FWBH unless Dr. Gardner is on vacation.
 - b. STAT path reviews are routed by region: **Community Division On-call pathologist** schedule is available. See "c" below for instructions.
 - a. Manually route North and Central stat path reviews using **ZZ packing list**:
 - i. North (WBHC and Mequon) send stat path reviews to Froedtert West Bend Hospital
 - a. From 8 am to 5 pm, Call Hematology department at 262-836-8215 to let them know a STAT path review is coming
 - b. After 5 pm call the on-call pathologist
 - ii. Central (Town Hall, North Hills, Tosa) send stat path reviews to Froedtert Menomonee Falls Hospital

- a. From 8 am to 5 pm, Call Hematology department at 262-257-3050 to let them know a STAT path review is coming
- b. After 5 pm call the on-call pathologist
- b. South (Drexel and Moorland) contact Dr. Gardner 262-836-8285 or Community Division on-call pathologist to review the Cellavision images and get approval to send path review stat to WDL.
 - i. Call WDL Hematology Department (414) 805-8425 to let them know a STAT path review is coming and which pathologist approved it.
- c. Finding Community Division Pathologist On-Call
 - i. The pathologist schedule is located on this web page: https://app.qgenda.com/landingpage/mcwpath
 - ii. You do not need to log in.
 - iii. Choose Full Schedule by Task at top of left-hand column



iv. On the left-hand side of the page you will find filters. Under Tasks filter, Type **MF** and choose **MF/WB Call**. The display will now show the on-call pathology schedule for the community division:

QGENDA CD Task.png

i. See attachment for Pathologist phone numbers.

If pathologist has not responded within 15 minutes, page again. If no response on second page, call alternate contact number. After 3 attempts with no callback, contact site specific Medical Director via SPOK Directory.

Physician Ordered Pathology review (Peripheral Blood Smears) or Peripheral Blood Hemepath Review with Reflex to Flow.

- A. If a LAB2025 Physician Requested Peripheral Blood Hemepath Review or LAB2039 Peripheral Blood Hemepath Review with Reflex to Flow is ordered by a physician no additional order needs to be placed by tech. Order should be placed concurrently or as an add-on to an existing CBC or CBCD order.
- B. Physician Ordered Peripheral Smear HemePath Review or Peripheral Blood Hemepath Review with Reflex to Flow go directly to the Send Out Bench.
 - 1. The tech will need to go to Result Entry, scan the specimen barcode for the Pathology Review and mark Slide Sent from the Scanned tab of Outstanding List.
 - 2. The reason for review and patient diagnosis are entered by the physician at time of order. This information automatically populates the "Patient Diagnosis" and "Reason for Review" in Beaker Result Entry. Any additional pathology review criteria met on the CBC or CBCD should be added to the "Reason for Review" box.
 - a. If "Reason for Review" includes hemolysis, scan the smear for schistocytes and spherocytes and follow appropriate path review process based on what is observed.
 - Also check the Snapshot Window for Linked Orders. Ensure that the most recent CBC or CBCD is linked to the test. If there is no test linked, link the most recent CBC or CBCD using the Link Orders button at the top of the Outstanding List screen.
 - 4. Click the save icon under the test name. Physician Requested Peripheral Blood Hemepath
- C. Make slides and stain them. Review the slide for staining quality and accuracy of the CBC results prior to submitting to pathologist for review. Send an unstained smear as well.
- D. If the Peripheral Blood Hemepath Review with Reflex to Flow is ordered, send the EDTA tube along with the slide.

Pathologist Result Entry

- A. Pathologist will enter interpretation comments in LIS.
- B. Pathologist will contact physician if critical communication is indicated.
- C. Reporting of a pathology review comment is done at the discretion of the pathologist. Pathology smear review may be canceled in LIS if pathologist determines there will be no value added to patient care from the pathology smear review.

Slide disposition

A. Slides sent to WDL will be kept at WDL. FWBH will return slide to requesting location.

Review of Path Review Follow-up Worklist

- A. After the pathologist final verifies path review results, a task will be created on the originating location's Review of Path Review Follow-up Worklist.
- B. Each tech is responsible for monitoring the follow-up worklist for the pathology smear reviews that he/she/they sent.
 - 1. The review is an educational opportunity to see what the pathologist's interpretations and recommended follow up.
 - 2. The pathologist may also send internal comments to the submitting tech regarding quality of smear and stain for process improvement.
- C. It is expected that the submitting tech will review and complete the task within 1 month of submitting the smear review.

REFERENCES:

Stahl, Mckenzie; Pathologist Smear Review; Wisconsin Diagnostic Laboratory; January 2025

Webb, Carolyn; Stahl, Mckenzie; Path Review Procedure Questions; Froedtert email 2/26/25

www.cancer.org

Attachments

- Link Orders.png
- MDF Smart phrase.png
- Path Review Quick guide 03-19-2025.docx
- Pathology Phone Numbers.docx
- PBPR chart review.png

- **Peripheral Smear Hemepath Review.png**
- Name
 Physician Requested Peripheral Smear Review.png
- **QGenda CD on call.png**
- **[®] QGENDA CD Task.png**

Approval Signatures

Step Description	Approver	Date
Technical Specialists	Colleen Turtenwald: Technical Specialist	Pending
Technical Specialists	Carolyn Webb: Heme Technical Specialist	02/2025
Policy Owner	Carolyn Webb: Heme Technical Specialist	02/2025

Applicability

Community Physician

Standards

No standards are associated with this document